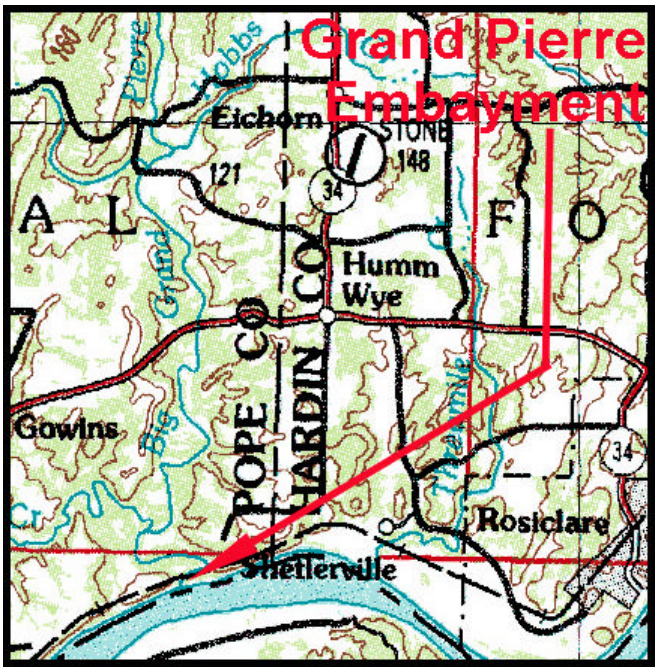
GRAND PIERRE CREEK EMBAYMENT (IL-12)

1.0 Location

The proposed Grand Pierre Creek embayment project area is located in Pope County, Illinois approximately 2.5 miles southwest of Rosiclare, Illinois. The project site is within the Ohio River Smithland Pool, and the mouth of Grand Pierre Creek embayment enters the Ohio River at Ohio River Mile (ORM) 898.0. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).



2.0 Project Goal, Description, and Rationale

The primary goals of the Grand Pierre Creek embayment project are to provide access to deepwater off-channel fish habitat in Grand Pierre Creek embayment, to maintain the opening to the Grand Pierre Creek embayment, and to provide rock spawning habitat for fishes. The opening for Grand Pierre Creek would require maintenance dredging prior to the installation and construction of a rock revetment. Installation of the hard point structure would create habitat diversity for aquatic species such as fish and benthic invertebrates.

By dredging the mouth of the embayment and installing the hard point structure at the mouth of the embayment, year-round deep water connectivity to the upstream portion of the embayment will be restored.

Mouth of Grand Pierre Creek

3.0 Existing Conditions

Terrestrial/Riparian Habitat: The banks of Grand Pierre Creek embayment are populated with a band of riparian trees. The dominant species present in the stand include box elder (*Acer negundo*), black willow (*Salix nigra*), and silver maple (*Acer saccharinum).* Behind the narrow riparian band to the east and west, the terrestrial habitat is agricultural, predominantly row crops. In the upstream reaches of the embayment to the north, the terrestrial habitat in the Grand Pierre Creek watershed is predominantly upland forest.

Aquatic Habitats: The Grand Pierre Creek embayment is primarily a narrow riverine type embayment with depths that range from 1-15 feet. The average water depth in the embayment is less than two feet. The banks are characterized by mud, and the bottom substrates are composed primarily of silt, mud, and fine sand. The mouth of the embayment has become filled with silt due to several factors. These factors include: raised water levels from the impoundment of the Smithland Pool; deposition of silt from the main Ohio River Channel, especially during flood events; wave action from barge traffic; and headwater sediments and debris from the Grand Pierre Creek watershed.

Grand Pierre Creek Embayment

There is a complex stand of tree stumps in the littoral zone as the result of the increased water levels associated with the completion of the Smithland Dam in the early 1980's. The increased water levels in the Smithland Pool transformed the affected portions of Grand Pierre Creek in the project area from free flowing stream to a narrow slackwater embayment. The increased water level killed the trees in the affected portion of the riparian zone, and the tree stumps are all that remain.

Wetlands: There are no jurisdictional wetlands present in the immediate vicinity of the proposed Grand Pierre Creek embayment improvements. Wetlands in the vicinity of the project would be restricted to the bottomland hardwoods associated with the riparian zone adjacent to the Ohio River.

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are five federally-listed endangered species known to occur in Pope County, Illinois, and they are the Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), fat pocketbook pearly mussel (*Potamilus capax*), bald eagle (*Haliaeetus leuccocephalus*), and the least tern (*Sterna antillarum*).

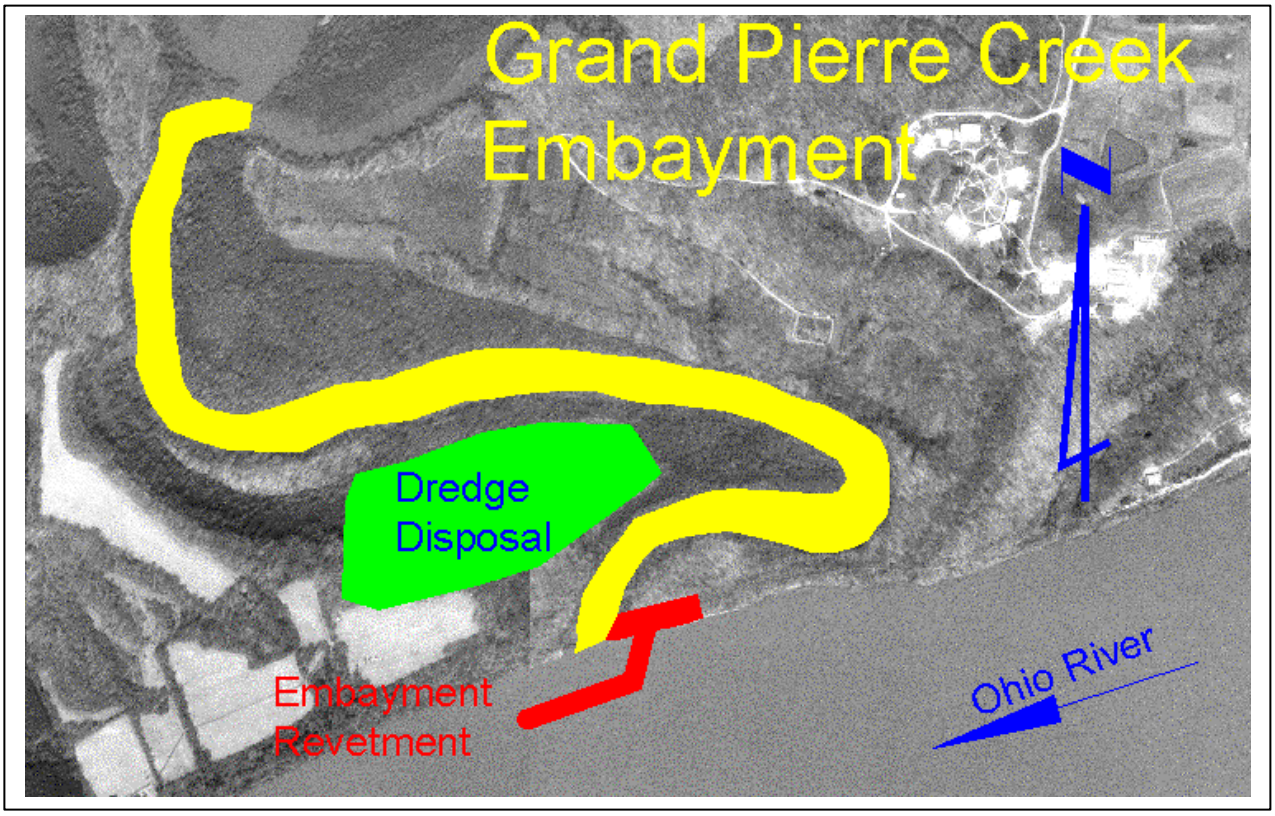
The riparian corridor adjacent to the Ohio River and Grand Pierre Creek may provide summer roost habitat for the Indiana bat. Preferred tree species would include a mixture of oaks, silver maple, cottonwood (*Populus deltoides*), and shagbark hickory (INHS, 1996). The riparian corridor would also provide feeding/foraging habitat for the Indiana bat and gray bat.

Although life history information for the fat pocketbook pearly mussel is limited, it is believed that this mussel is a large river species that requires flowing water and a stable substrate (USFWS, 1989). This habitat is not present in the embayment.

Bald eagles may use the project site and other areas along the Ohio River during spring and fall migrations. No nesting sites are known from the site.

Least terns typically nest on barren sand islands which are not present at the Grand Pierre Creek site.

4.0 Project Diagram



5.0 Engineering Design, Assumptions, and Requirements

5.1 Existing Ecological/Engineering Concern

The Grand Pierre Creek embayment has filled with sediments due to several factors. These factors include: raised water levels from the impoundment of the Smithland Pool; deposition of Ohio River silt-laden waters, especially during flood events; wave action from barge traffic; and headwater sediments from the Grand Pierre Creek watershed.

5.2 Embayment Dredging

Maintenance dredging of the mouth of the embayment is required to restore deep water connectivity to the remainder of the embayment and to reestablish a suitable depth for boater access. An estimated 32,650 cubic yards of silty-clay material would be dredged to restore depths of 9-12 feet in the embayment mouth. A dredge disposal site in an agricultural field is adjacent to the embayment. A small levee, 9 feet high, and 415 feet in length would be constructed at the designated disposal site for dewatering.

5.3 Embayment Rock Revetment

A rock revetment has been designed to attempt to slow the rate of sedimentation. This large rock structure would provide an area of increased velocities, which would create a scour hole at the embayment mouth.

Design Features:

- The structure would extend downstream at a 60-degree angle from the channel bank for 100 feet. The structure would then turn and be parallel to the bank for 200 feet (Figure 1).
- The top width is 5 feet with 1.5 to 1 side slopes.
- The dike shall be toed into the sub-grade a minimum of 2 feet and stand above the channel bottom 5 feet.
- The top of the structure shall be a minimum of 5 feet below the normal pool elevation of 324.0.
- The size of the rock used shall be uniformly graded limestone with each rock weighing between 50 and 100 pounds. Normally a well-graded rock would be used, however, a uniform gradation would provide better aquatic habitat.

5.4 Planning/Engineering Assumptions

Dredging

- A small auger head dredge would be used, and the material would be pumped directly to the disposal site.
- Bottom side slopes will be reshaped to a 3:1.
- All the material required for the levee would be taken from on site.
- A 2,320 gallons per minute (gpm) centrifugal pump would be used for dewatering. Dewatering would commence 18 days after dredging begins to prevent the dewatering basin from exceeding capacity.

Embayment Revetment

- Average channel velocities are 3 feet per second.
- All rip-rap material would be shipped by barge to the project site. All costs for loading material onto the barge are included in the material costs.
- Excavated material from site preparation can be disposed of into the main river channel, or along the main channel bank.

6.0 Cost Estimate (Construction)

Dredging - Engineering costs for the proposed project are contained on Table 1. A detailed MCACES cost estimate for the proposed project is included in Appendix C.

Table 1. Engineering Costs.

Item	Cost
Dredging	$41,000
Levee	$31,900
Dewatering	$18,000
Embayment Revetment	$52,600
Mobilization	$25,200
TOTAL	**$168,700**

7.0 Schedule

Grand Pierre Creek Embayment Dredging: The estimated construction time for this project is shown on Table 2.

Table 2. Construction Schedule.	
Item	**Time**
Dredging	46 Days
Levee	20 Days
Dewatering	18 Days
Embayment Revetment	4 Days
Mobilization	4 Days
TOTAL	**92 Days**

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitat: The impacts of the Grand Pierre Creek Embayment rehabilitation/dredging project would be primarily in-stream. There would be no reasonably foreseeable beneficial impacts to terrestrial/riparian resources as a result of implementing the proposed project.

Aquatic Habitats: Long-term beneficial impacts to aquatic resources would be anticipated as a result of implementing the proposed project. The addition of the hard substrate (rip-rap) would result in long-term beneficial impacts to aquatic species due to the increase in the habitat diversity. Dredging of the mouth of Grand Pierre Creek embayment would result in long-term beneficial impacts to fishes due to the improved/deepened access to the Grand Pierre Creek embayment. Fishes would be allowed free access to the embayment, especially during low flow periods. Habitat requirements for fishes change seasonally and improved access to the embayment would be considered beneficial (Sheaffer, 1986 and Scott, 1989). Restoring/increasing the depths of the embayment would provide over-wintering habitat for fishes, especially sport fish such as black basses (Sheehan, 1994).

Wetlands: There would be no beneficial impacts to jurisdictional wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no reasonably foreseeable beneficial impacts to federally-listed threatened or endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be short-term and long-term beneficial impacts to socioeconomic resources as a result of implementing the proposed project. The short-term beneficial impacts would be related to costs and local expenditures associated with the construction/dredging of the embayment and the construction of the rock revetment. Long-term socioeconomic benefits would be realized through improved recreational fishing opportunities. Long-term indirect beneficial impacts will be realized through local expenditures for fishing tackle, hunting and fishing gear, food, gas, and other associated needs.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitat: There would be short-term adverse impacts to terrestrial/riparian resources as a result of implementing the proposed project. There would be short-term adverse impacts to terrestrial species from construction-related noise and disturbance. Considering the existing high volume of disturbance from barge traffic along the Ohio River and recreational boat

usage in the area, it is likely that the increased noise/disturbance impacts would be very minor. There would be short-term adverse impacts to the agricultural lands that lie to the northwest of the embayment. This area would serve as the dredge disposal site. Adverse impacts to this area would be considered short term, because it is assumed that the site can be farmed following the dewatering and grading of the spoil material.

Aquatic Habitats: There would be a potential for adverse affects to aquatic species, especially immobile benthic invertebrates and young-of-the-year fishes during the dredging of the Grand Pierre Creek embayment. Localized populations of benthic invertebrates could be covered with rip-rap during the construction of the revetment. In addition, sensitive aquatic species immediately downstream from the site could be adversely impacted by degraded water quality associated with displaced sediments, however these adverse impacts to aquatic species would be short term.

Wetlands: There would be no reasonably foreseeable adverse impacts to jurisdictional wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: Since the dredging and construction operation would primarily be in-stream near the mouth of Grand Pierre Creek embayment, it highly unlikely that Indiana or gray bats would be impacted by the proposed project.

Socioeconomic Resources: There would be no reasonably foreseeable adverse socioeconomic impacts as a result of implementing the proposed project.

10.0 Mitigation

Minor impacts associated with site dredging and spoil placement may occur during the construction of this project, however, no significant adverse impacts are expected. The use of best management practices and proper construction techniques would minimize adverse water quality impacts.

11.0 Preliminary Operation and Maintenance Costs: Operation and Maintenance costs are summarized on Table 3.

Table 3. Operation and Maintenance Costs

Maintenance	Frequency	Costs
Embayment Revetment	10 Years	$10,000
Maintenance Dredging	25 years	$9,000

12.0 Potential Cost Share Sponsor(s)

- State of Illinois
- B.A.S.S. or other fishing groups
- The Nature Conservancy
- barge/towing industry

13.0 Expected Life of the Project

The life expectancy of the rock structure is estimated to be 50 years. After dredging the mouth of the embayment, it is anticipated that additional dredging would not be required for 15-30 years.

14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings. The project site is located near the mouth of Grand Pierre Creek at the confluence of the creek and the Ohio River at river mile 898 in Pope County, Illinois. The nearest Illinois towns to the project site are Elizabethtown and Gloconda located about 5 miles upstream and downstream, respectively on the Ohio River.

The following environmental conditions were considered when conducting the July 19, 1999 project area inspection:

- Suspicious/Unusual Odors;
- Discolored Soil;
- Distressed Vegetation;
- Dirt/Debris Mounds;
- Ground Depressions;
- Oil Staining;
- Above Ground Storage Tanks (ASTs);
- Underground Storage Tanks (USTs);
- Landfills/Wastepiles;
- Impoundments/Lagoons;
- Drum/Container Storage;
- Electrical Transformers;
- Standpipes/Vent pipes;
- Surface Water Discharges;
- Power or Pipelines;
- Mining/Logging; and
- Other

HTRW Findings and Conclusions

None of the environmental conditions listed above were observed in the project area.

Old railroad trusses, part of which were burned, are in the project area. Wooded areas are to the north, east and west of the mouth of Grand Pierre Creek. The Ohio River is to the south of the creek.

15.0 Property Ownership & River Access

Selected data on properties immediately adjacent to the concept site were collected from the county courthouse for each site. Data collected included map and parcel identification number, property owner's name and mailing address, acreage of the potentially affected parcel, and market value of the parcel. This procedure involved obtaining a plat or parcel map of the site and surrounding area, which identified each parcel with a corresponding map and parcel number. The map/parcel identification number was subsequently used to determine the property owner's name and mailing address from records in the County Assessor's or County Auditor's office.

The market value of each parcel as contained in the property tables reflects the assessed valuation to supposedly market value ratio used by the State for taxation purposes. These assessed values reflect 1998 assessments. The assessed valuation ratio is $33\ ^{1}/_{3}$ percent for Illinois.

The above ratio was used to approximate the market value of each property. However, the resultant market value calculated under the above procedure may be below the actual value of the land in the real market. Local real estate brokers could provide a more accurate estimate of actual land values.

The collected property data indicate that private agricultural and commercial land is adjacent to Grand Pierre Creek embayment. Dredging equipment for the project can access Grand Pierre

Creek from the Ohio River. Dredge disposal is proposed to occur on adjacent agricultural lands. Access to these lands will be required for the proposed project (See Table 4).

Table 4. Property Characteristics

Site Name: Grand Pierre Creek Embayment
Location: Pope County, Illinois

Map/Parcel Number	Owner	Mailing Address	Market Value	Acreage
T13S-R7E, S3	U.S. Government	(not listed)	(not listed)	(not listed)

* Denotes improvements on property.

16.0 References

References:	
INHS, 1996	Illinois Natural History Survey Reports, March-April 1996. Survey Document #2152. Center for Biodiversity (J. Hofmann).
Scott, 1989	Scott, M.T. and L.A. Nielson. 1989. Young fish distribution in backwaters and main-channel borders of the Kanawha River, West Virginia. Journal of Fisheries Biology No. 35 (Supplement A) pp. 21-27.
Sheaffer, 1986	Sheaffer, W.A. and J.G. Nickum. 1986. Backwater areas as nursery habitats for fishes in Pool 13 of the Upper Mississippi River. Hydrobiology No. 136 pp. 131-140.
Sheehan, 1994	Sheehan, R.J., W.M. Lewis, and L.R. Bodensteiner. 1994. Winter habitat requirements and overwintering of riverine fishes. Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois. Final Report F-79-R-6.
USFWS, 1999	U.S. Fish and Wildlife Service, June 23, 1999. Federally Endangered, Threatened and Proposed Species, Illinois.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist

Project Site Location:

The proposed Grand Pierre Creek embayment project area is located in Pope County, Illinois approximately 2.5 miles southwest of Rosiclare, Illinois. The project site is within the Ohio River Smithland Pool, and the mouth of Grand Pierre Creek embayment enters the Ohio River at Ohio River Mile (ORM) 898.0. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

Description of Plan Selected:

The primary goals of the Grand Pierre Creek embayment project are to provide access to deepwater off-channel fish habitat in Grand Pierre Creek embayment, to maintain the opening to the Grand Pierre Creek embayment, and to provide rock spawning habitat for fishes. The opening for Grand Pierre Creek would require maintenance dredging prior to the installation and construction of a rock revetment. Installation of the hard point structure would create habitat diversity for aquatic species such as fish and benthic invertebrates.

By dredging the mouth of the embayment and installing the hard point structure at the mouth of the embayment, year-round deep water connectivity to the upstream portion of the embayment will be restored.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? **Yes** and description

Complete dredging but do not install rock revetment.

Larger Size Plan Possible? **No** and description

Other alternatives? **No**

Restore/Enhance/Protect Terrestrial Habitats? [ ] **Objective numbers met** [ ]

Restore, Enhance, & Protect Wetlands? [ ] **Objective numbers met** [ ]

Restore/Enhance/Protect Aquatic Habitats? [Yes] **Objective numbers met** [A1, A5, A6, A7]

Type species benefited: Fishes (especially black basses) and invertebrates including mussels.
Endangered species benefited: No

Can estimated amount of habitat units be determined: 0.25 acres deepened by dredging

Plan acceptable to Resources Agencies?
U.S. Fish & Wildlife Service?
State Department of Natural Resources? Yes – Illinois DNR

Plan considered complete? **Connected to other plans for restoration?**

Real Estate owned by State Agency? **Federal Agency?**
Real Estate privately owned? Adjacent lands are privately owned.
If privately owned, what is status of future acquisition Acquisition is not necessary.

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

Provide habitat diversity, over-wintering habitat, and winter velocity shelters for fishes.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

No

In agencies opinion is the plan the most cost effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?
Yes / No
Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity:_____
Non-government Entity _____

Corps Contractor _____Date_____

U.S. Fish & Wildlife Representative _____Date_____

State Agency Representative _____Date _____

U.S. Army Corps of Engineers Representative _____Date _____

Terrestrial Habitat Objectives

T1 Riparian Corridors

T2 Islands

T3 Floodplains

T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

W1 Forested Wetlands: Bottomland Hardwoods

W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands

W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

Aquatic Habitat Objectives

A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)

A2 Riverine submerged and aquatic vegetation

A3 Sand and gravel bars

A4 Riffles/Runs (tailwaters)

A5 Pools (deep water, slow velocity, soft substrate)

A6 Side Channel/Back Channel Habitat

A7 Fish Passage

A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)